

We Claim:

1. A method for determining the position of a moveable object within a given area, which comprises:

taking a sequence of frames of a given area with a video camera and calculating a current position of an object in the given area by electronically evaluating the frames of the sequence;

comparing a currently taken one of the frames with a previously stored one of the frames to produce a differential image in which a contour of the object appears only when the object moves; and

calculating the position of the object based on the differential image.

2. The method according to claim 1, wherein the object is a head of a front seat passenger in a vehicle.

3. The method according to claim 1, which comprises, as long as the object is located within a predetermined region:

a1) calculating a current differential image;

- b1) extracting a current contour of the object from the current differential image;
- c1) after initiation, defining a first contour and using the first contour as a template; for all further contours, incorporating the current contour into the template in a weighted manner; and
- d1) repetitively performing steps a1 through c1 in order.

4. The method according to claim 3, which comprises, if the object moves out of the predetermined region:

- a2) calculating the current differential image;
- b2) extracting the current contour from the current differential image;
- c2) calculating the position of the object using a cross-correlation of the current contour with the template;
- d2) if a magnitude of the correlation exceeds a predefined amount, centering a measuring window on the current contour, replacing the template with the current contour, and going to step e2); in an absence of a differential image, jumping to step a2); otherwise jumping to step a1);

e2) if the contour is again within the predetermined region:
jumping to step a1);

f2) if the contour moves in a predetermined warning region,
issuing an alarm signal; and

h2) jumping to step a2).

5. A device for determining the position of a moveable object
within a given area, comprising:

a video camera with a defined frame sequence time;

a control unit with a computer unit; and

a frame storage device storing evaluation software;

said evaluation software configured to perform the method
according to claim 1.

6. The device according to claim 5, wherein said frame storage
device has a capacity for storing at least five frames.

7. The device according to claim 5, wherein said video camera is a camera selected from the group consisting of a CCD camera and a CMOS camera.

8. The device for determining the position of a moveable object according to claim 5, wherein:

the object is a head of a passenger in a front seat of a vehicle having a dashboard;

said video camera has an optical axis and is configured such that the optical axis is aligned approximately perpendicularly with respect to a plane in which movements of the passenger normally take place between the front seat and the dashboard; and

said camera has optics that register at least approximately in a region between the passenger and the dashboard.

9. The device according to claim 8, comprising:

an airbag control device activated dependent on a prediction of when the head of the passenger will penetrate into a hazard range;

said prediction based on a trajectory of the head and a speed of the head.

10. The device according to claim 5, comprising an infrared light source, said video camera provided with a filter that cuts out wavelengths below a near infrared spectrum range.

11. The device according to claim 5, wherein said control device receives an emergency braking signal when an emergency braking occurs.